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KAISER ALUMINUM & CHEMICAL CORPORATION

Trentwood Works

SPECIFICATION NO. TR-20551

EAST LANDFILL COVER

April 25, 1983

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1.0 SCOPE

1.1 Work Included

The work covered by this Specification consists of providing all labor, supervision, materials, equipment, and transportation to install a clay and soil cover on the Trentwood Works East Landfill. Included are excavation and embankment for rough grading, supplying and installing the clay layer, supplying and installing topsoil, and seeding, as specified herein and as shown on the drawings.

The project site is located on the east side of Owner's Trentwood Works. (See Owner's Drawing No. DM-14661.) Access to the site is off Owner's perimeter road which intersects Euclid Road. The clay borrow site location shall be one of the sites described in Attachment A to this Specification or as approved otherwise by the Owner in writing.

2.0 SPECIAL PROVISIONS

2.1 Applicable Publications

All work performed and all materials furnished hereunder shall conform to the rules and regulations of any statutory authority having jurisdiction, including the Occupational Safety and Health Act, (OSHA) and the requirements of the State of Washington, whichever is the more stringent and shall be in accordance with the drawings, the standard specifications and the industry and government standards and codes listed below. Latest additions or revisions as of the date of this specification or the publications listed or referred to herein, or noted on the drawings are, by such listing referenced or notation made a part thereof.

2.0 SPECIAL PROVISIONS (Continued)

2.1 Applicable Publications (Continued)

2.1.1 Drawings

The following contract drawings shall apply:

KACC DRAWING NO.	DATE	TITLE
DM-14661 Rev. 0	5-19-81	Plot Plan - Building Layout
DM-15367 Rev. 1	4-25-83	E Landfill Cover Design - Arrangement
DM-15368 Rev. 0	12-14-82	E Landfill Cover Design - Sections

2.1.2 Standards

ASTM Procedure D 1557

State of Washington Specification for Road & Bridge
Construction - 1980

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2.2 Commencement, Prosecution and Completion

Upon receipt of Owner's Notice of Award, the Contractor shall commence immediately, all preparatory work requirements, but excluding site work on the Owner's premises. The Contractor shall commence site work on the date specified in the Owner's written Notice to Proceed with Field Work, and shall complete the work within sixty (60) calendar days, starting with the date specified in the Notice to Proceed with Field Work. Within one week of the issue of the Notice to Proceed, the Contractor shall furnish to the Owner a schedule of his work to complete the project.

The Owner anticipates that field work will commence on or about July 1, 1983.

2.3 Area Available to Contractor

The Contractor shall confine his storage and other activities related to the work to the open areas immediately in the vicinity of the work being done. The dump site is bounded on the north, south and west by fence with the east side being the dump side. This area is approximately 680 feet X 680 feet. The Contractor shall furnish necessary sanitary facilities.

3.0 OWNER FURNISHED SERVICES AND MATERIALS

The following services and materials will be furnished by the Owner.

3.1 Four (4) sets of drawings & specifications.

3.2 Access road to the vicinity of the work.

3.3 A water source (nearest fire hydrant).

4.0 ITEMS OF WORK IN SCOPE OF THIS SPECIFICATION

The scope of work required under this Specification is described in two places; (a) The contract drawings referred to in Section 2, and (b) the language of this specification. The work shown on the contract drawings and as described herein describe the work the Contractor is to perform. This work shall include, but not be limited to, the following items.

4.1 Excavation and General Embankment

4.1.1 Excavation: Prior to the start of excavation, all vegetation shall be removed by the Contractor from the area to be excavated and disposed of in the Owner's pit on the east edge of the site. Excavation shall be to the lines shown on the drawings, or as directed by the Owner's Representative to obtain sufficient general fill material for the embankment.

Care shall be taken not to segregate material as it is being excavated and placed in the embankment, it being the intention that the general fill material in the embankment be uniform and homogeneous.

Excavation shall be unclassified, irrespective of the nature or type of material encountered. Rocks encountered in the excavation that are not suitable for general fill material shall be left in place or disposed of in the Owner's pit at the Owner's option. This work shall be performed by the Contractor. If the Contractor encounters material in the excavation that is not naturally occurring material, the Owner shall be notified immediately to determine the proper location in the embankment for this material. Exploratory trenches on the site indicate that this is not a likely circumstance.

4.0 ITEMS OF WORK IN SCOPE OF THIS SPECIFICATION (Continued)

4.1 Excavation and General Embankment (Continued)

4.1.2 General Embankment: Prior to starting construction of the embankment, all vegetation shall be removed by the Contractor from the embankment area and disposed of in the Owner's pit on the east edge of the site.

The existing rubble on the embankment site consisting of concrete foundations, bricks, insulation, scrap iron, etc. is suitable for general fill material in the embankment subject to approval of Owner. This rubble shall be graded so that it will be a minimum of two feet below the clay material.

Embankments shall be constructed in lifts which shall not exceed eight (8) inches, loose height. The entire embankment shall be brought up uniformly and level, and shall be moisture conditioned and compacted, as required, to achieve 95% maximum Standard Proctor density.

After all general embankment has been made, the embankment surface shall be bladed and smoothed.

The intent of this Specification is that all of the required general fill material be obtained from the on-site excavation area as shown on the drawings. The Contractor shall excavate enough material from this site to bring the general embankment to the grades shown on the drawings. Any required adjustments to the grades shown on the drawings shall be made in the excavation area. However, the finished slopes in the excavation area shall be as shown on the drawings. Earthwork quantities for general fill materials shown on Drawing DM-15367 have been calculated on the basis of a 15% shrinkage factor.

4.0 ITEMS OF WORK IN SCOPE OF THIS SPECIFICATION (Continued)

4.1 Excavation and General Embankment (Continued)

4.1.3 Compaction: Compacting equipment for general embankment may be of any type, provided it is capable of compacting each lift of material to the specified density. Special attention shall be paid to the area near the existing well to insure that it is properly compacted without damage to the well casing.

It shall be the Contractor's responsibility to operate compaction equipment to provide embankment meeting the required density. It is the intent of this Specification to permit the Contractor to use his equipment, experience, and skills to construct an adequate embankment. If the results of the density testing show that the embankment is not meeting the 95% density factor additional compaction shall be required. All test sites not meeting the required 95% density shall be re-excavated to a depth necessary to achieve the 95% density. The Owner shall bear the costs of any initial testing and the Contractor shall bear all costs incurred that require corrective work as a result of the testing plus the cost of any subsequent testing.

Regardless of the above paragraph, the Owner will have random density tests run to determine the adequacy of the work. The work will not be accepted until tests are completed and results are as specified above.

4.0 ITEMS OF WORK IN SCOPE OF THIS SPECIFICATION (Continued)

4.1 Excavation and General Embankment (Continued)

- 4.1.4 Water: Moisture content of embankment materials shall be maintained at optimum values necessary to achieve the required compaction. Water will be supplied free of charge for use at the site. The Owner will designate the water supply location. The Contractor shall maintain the water supply area during use and leave the area in its original condition when the work is completed.

As in Section 4.1.3 Compaction, it is the intent of this Specification to permit the Contractor to use his equipment, knowledge, and skills to achieve a satisfactory embankment and utilize water to his advantage.

4.2 Clay Layer Construction

- 4.2.1 Purpose: The Contractor shall construct a uniform compacted clay layer atop the prepared landfill surface. Because the in-place permeability is sensitive to placement and compaction methods, the work will require careful construction procedures and quality control.

4.0 ITEMS OF WORK IN SCOPE OF THIS SPECIFICATION (Continued)

4.2 Clay Layer Construction (Continued)

4.2.1 Purpose: (Continued)

The work shall include, but not necessarily be limited to, the preparation of the landfill surface, purchase and transport of acceptable clay soils to the site, spreading of the clay soils in thin lifts, processing of the clay to break up lumps, etc., moisture conditioning of the clay soils where necessary, and compaction of soils to the specified density.

4.2.2 Materials: The clay layer shall be constructed with a clay that has a coefficient of permeability not greater than 2.0×10^{-7} cm/sec. when compacted to 90% or more of the Modified Proctor density (ASTM D 1557). The clay soil shall be free of debris, rock, gravel, organics, frozen chunks, and deleterious materials.

Four sources containing acceptable clay soils have been identified by the Owner, all within about 10 to 15 miles of the landfill site. However, the Contractor shall be responsible for making his own arrangements as to availability, quantities, excavation, transport, and cost with the appropriate owners or their agents. The four sources are shown on Attachment A and B attached.

The Contractor is free to locate and select the clay soil from some other source, provided he first establishes, through a minimum of three laboratory tests, that the coefficient of permeability is not greater than 2.0×10^{-7} cm/sec. when compacted to 90% or more of the Modified Proctor density. Prior to starting work, the Contractor shall notify the Owner in writing of the clay pit location.

4.0 ITEMS OF WORK IN SCOPE OF THIS SPECIFICATION (Continued)

- 4.3 Site Preparation: Site preparation shall include the removal of all surface debris, rocks, broken concrete, etc. protruding above the surface. The landfill surface beneath the clay layer shall be graded reasonably even to facilitate construction of the clay layer. Hard spots produced on the surface by routing of hauling and construction equipment shall be scarified to allow for reasonable blending of the first lift of clay into the surface.
- 4.4 Clay Placement: The clay shall be spread in reasonably uniform, even lifts not greater than 6 inches in loose height. If necessary, each lift shall be disced, harrowed, bladed, or otherwise processed to break down all chunks or clods of clay greater than one-third the compacted lift thickness in average dimension. This work shall be accomplished prior to or in conjunction with moisture conditioning (see Section 4.5), but before compaction. Materials shall not be spread on frozen surfaces.
- 4.5 Moisture Conditioning: If necessary, each lift shall be moisture conditioned prior to compaction to produce an in-place moisture content within the range of -1% to +3% of the optimum moisture content determined by ASTM Procedure D 1557. In addition, blading, harrowing, etc. shall be accomplished as necessary to provide a reasonably uniform moisture content distribution throughout each lift. Merely wetting (or drying) the surface without blending will not be acceptable.
- 4.6 Compaction: Compaction shall be accomplished with a kneading-type compactor, such as a sheepsfoot roller or rubber-tired roller approved by the Owner. Lifts shall be compacted to produce an in-place compacted density not less than 90% of the modified Proctor density (ASTM D 1557).

4.0 ITEMS OF WORK IN SCOPE OF THIS SPECIFICATION (Continued)

4.7 Testing and Reworking: The Contractor, at the direction of the Owner, shall cut test trenches through selected lifts to determine homogeneous and impervious soil structure is obtained. If the test trenches disclose a system of interconnected, visible voids, the lifts shall be scarified, moisture conditioned, if necessary, and then recompact. Reconditioning and recompaction, if necessary, shall be accomplished at no additional expense to the Owner.

4.8 Other Construction Procedures: The primary objective of Specification paragraphs 4.4, 4.5, and 4.6 is to achieve a compacted clay fill that is relatively uniform and possesses the required coefficient of permeability. The completed layer should be free of voids caused by improper breaking of dry clay chunks or clods that may tend to increase the effective permeability of the layer. The Contractor shall be free to select other construction methods, provided he can demonstrate in the field to the satisfaction of the Owner that the final product meets the Specification with regard to uniformity and impermeability as specified in paragraph 4.2.2 of the Specification.

4.9 Topsoil

4.9.1 The Contractor shall furnish and place topsoil as shown on the drawings. Topsoil shall be State of Washington Standard Specification for Road & Bridge Construction, Item 9-14.1 (1) Topsoil Type A., Page 9-14. Topsoil shall be free from materials toxic to plant growth, subsoil, stones, and other debris. Topsoil shall consist of a sandy clay loam, sandy loam, loam, clay loam, silty clay loam, or silt loam soil. The maximum percentage composition for each component is:

<u>Component</u>	<u>Maximum Percentage Allowable</u>
Sand	65%
Silt	80%
Clay	45%

The maximum allowable percentage of gravel retained on a 1/4 inch screen shall not exceed 20% of volume.

4.0 ITEMS OF WORK IN SCOPE OF THIS SPECIFICATION (Continued)

4.9 Topsoil (Continued)

4.9.2 An alternative topsoil is a mixture of equal parts of sawdust, sand, and peat humus.

4.9.3 Topsoil shall be spread in reasonably uniform, even lifts not greater than 6 inches in loose height and compacted to 85% of maximum Standard Proctor density. A good grade of commercial fertilizer shall be added after compaction of topsoil.

4.10 Fencing

4.10.1 The contractor shall furnish and install the east side fencing of the landfill site. The fence shall be approximately 680 feet long and six (6) feet high. It shall be the same as the existing fencing, that is, cyclone (chain link) fencing topped with two (2) strands of barbed wire.

4.10.2 Any existing fencing damaged or removed by the Contractor shall be returned to its original condition.

4.11 Seeding

4.11.1 All disturbed areas shall be seeded with a pasture grass mix consisting of the following components;

<u>Component</u>	<u>Weight %</u>
layback alfalfa	5
fawn tall fescue	35
annual and perennial rye	30
orchard grass	30

The mix shall be applied at the rate of 20 pounds per acre. Prior to seeding, the area to receive the seed shall be lightly harrowed. Seed shall be uniformly applied at the specified rate with an approved drill or broadcaster. Following seeding, the ground shall again be lightly harrowed. It is mandatory to achieve a shallow planting of the seed with only minimal soil cover.

4.0 ITEMS OF WORK IN SCOPE OF THIS SPECIFICATION (Continued)

4.11 Seeding (Continued)

4.11.2 The Contractor shall schedule the seeding so that the grasses are well established before the winter season begins.

4.12 Control

4.12.1 The Contractor shall provide construction staking to maintain the grades and elevations shown on the drawings.

4.13 Cleanup

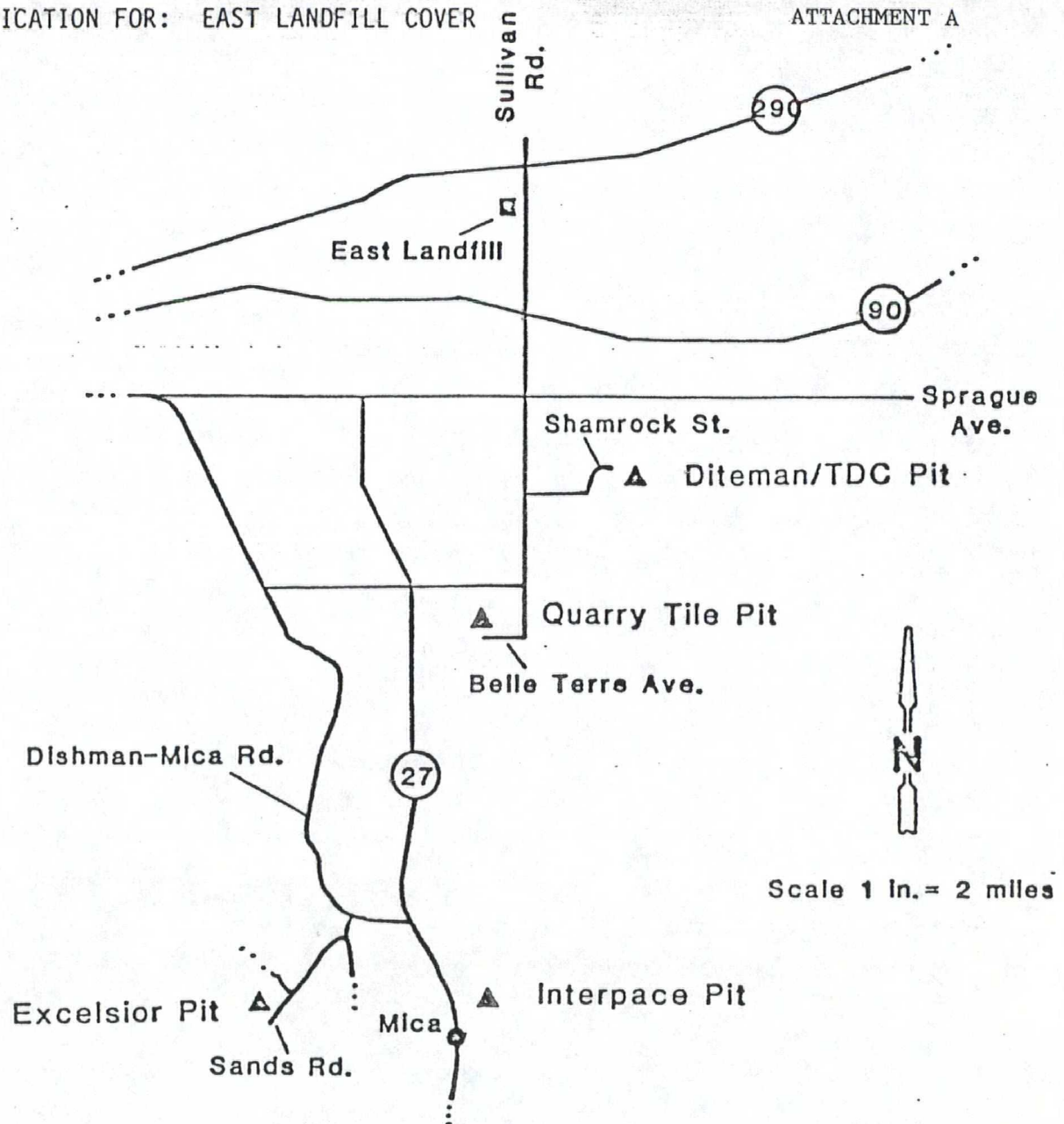
4.13.1 During the course of the job, the Contractor shall not cause unsafe conditions on any public or private roads. After the clay borrowing is complete, the Contractor shall furnish to the Owner a letter from the Pit Owner stating that the clay pit has been left in satisfactory condition. The Contractor shall abide by all Spokane County regulations for hauling on public right-of-ways.

4.13.2 Upon completion of construction, the Contractor shall cleanup the site to the satisfaction of the Owner's representative.

4.13.3 The Contractor shall be responsible for locking the gate on the east landfill site at the end of each day of construction. This will be the Contractor's responsibility for the duration of the contract.

SPECIFICATION FOR: EAST LANDFILL COVER

ATTACHMENT A



<u>PIT</u>	<u>RND, TRIP HAUL - Miles (ESTIMATED)</u>
Interpace	20.0
Quarry Tile	10.8
Excelsior	23.6
Diteman/TDC Incorp.	9.2

East Landfill Closure
Kaiser Trentwood Plant

CLAY SOURCES

Oct. 1982

E-0554-01

SHANNON & WILSON, INC.
GEOTECHNICAL CONSULTANTS

FIG. 1

TABLE 1
DATA SUMMARY - CLAY SOURCES

<u>Source</u>	<u>Owner</u>	<u>Contact (phone #)</u>	<u>Material Description</u>	<u>Permeability cm/sec</u>	<u>Rnd. Trip Haul* miles</u>
Interpace Pit	Interpace Corporation	Don Cramer (924-2120)	Red-brown, low plasticity clay	1.0×10^{-7}	20.0
Quarry Tile Pit	Quarry Tile Corporation	Dick Bailer (924-1466)	Grayish-white, low plasticity clay	5.0×10^{-8}	10.8
Excelsior Pit	Vern Eden	Vern Eden (928-5914)	Red-brown, highly plastic silt	4.8×10^{-8}	23.6
Diteman/ TDC Incorp.	Richard T. Diteman & TDC	Unable to contact owners	Stratified silts and clays	1.5×10^{-7}	9.2

*Estimates only; distances should not be used for bidding purposes.

9-13.5(2) Poured Portland Cement Concrete Slope Protection.

Cement concrete for poured concrete slope protection shall be Class B in conformance with Section 6-02.3.

Wire mesh reinforcement shall conform to Section 9-07.4.

9-13.5(3) Pneumatically Placed Portland Cement Concrete Slope Protection.

Cement: This material shall be portland cement as specified in Section 9-01.

Aggregate: This material shall meet the requirements for fine aggregate as specified in Section 9-03.1. The moisture content of the fine aggregate at the time of use shall be between 3% and 6% by weight.

Reinforcement: Wire mesh reinforcement shall conform to the provisions of Section 9-07.4.

Water: Water shall conform to the provisions of Section 9-25.1.

STATE OF WASHINGTON
STANDARD SPECIFICATIONS
FOR ROAD + BRIDGE
CONSTRUCTION. 1980

9-14 ROADSIDE SEEDING AND ROADSIDE PLANTING**9-14.1 Soil.****9-14.1(1) Topsoil Type A.**

The topsoil shall be friable surface soil from the A horizon as determined by the United States Agriculture Soil Conservation Service Soil Survey. Topsoil shall be free from materials toxic to plant growth; noxious weed seeds, rhizomes, roots; subsoil; stones and other debris. 100% of the topsoil shall pass through a 1 inch screen. Maximum Electrical Conductivity shall be 2.0 milliohms and the maximum Exchangeable Sodium Percentage shall be 10%.

Topsoil Type A shall consist of a sandy clay loam, sandy loam, loam, clay loam, silty clay loam, or silt loam soil. These soil textural classes shall be determined by the United States Department of Agriculture Classification System. These textural classes shall be restricted by the following maximum percentage compositions based on the material passing the Number 10 screen.

Separates	Maximum Percentage Allowable
6 Sand	65%
Silt	80%
Clay	45%

The maximum allowable percentage of gravel retained on a 1/4 inch screen shall not exceed 20% by volume. Of the material passing the 1/4 inch screen, the maximum allowable percentage of gravel retained on a Number 10 screen shall not exceed 10% by weight. Total organic matter shall be 1% to 10% except in samples containing more than 20% clay, it shall be 2% to 10%. Organic matter shall be determined by the Walkley-Black sulphuric acid dichromate digestion process. The pH shall be 5.5 to 8.0.

9-14.1(2) Topsoil Type B.

Topsoil Type B shall be native topsoil taken from within the project limits, either from the area where roadway excavation is to be performed; or from strippings from borrow, pit, or quarry sites; or from other designated sources.

9-14.1(3) Special Soil Mix.

The special soil mix shall consist of a uniform blend composed of 3/4 sand and 1/4 sawdust or ground bark. The mixture shall pass a 1 inch

screen. The sand shall consist of granular material meeting the following grading requirements:

% Passing 1/4 inch screen	90	min.
% Passing U.S. No. 50 sieve	30	max.
% Passing U.S. No. 100 sieve	3	max.
All percentages by weight.		
Sand Equivalent	50	min.

The sawdust or ground bark shall be free of chips, chunks and large splinters, and shall not contain any compounds in quantities that are detrimental to plant life. The pH shall be between 5.0 and 7.5.

The mixture shall be fertilized with ureaform or ureaformaldehyde, calcium nitrate, superphosphate and sulphate of potash magnesia at rates indicated from a soil test or as directed by the Engineer.

All materials will be pre-mixed prior to bringing to the jobsite.

9-14.2 Seed.

Grasses, legumes, or cover crop seed of the type hereinafter specified shall conform to the standards for "Certified" grade seed or better, as outlined by the State of Washington Department of Agriculture "Rules for Seed Certification," latest edition. Seed shall be furnished in standard containers on which shall be shown the following information:

- (1) Common name of seed
- (2) Lot number
- (3) Net weight
- (4) Percentage of purity
- (5) Percentage of germination (in case of legumes percentage of germination to include hard seed)
- (6) Percentage of weed seed content and inert material clearly marked for each kind of seed in accordance with applicable State and Federal laws.

Upon request, the Contractor shall furnish to the Engineer duplicate copies of a statement signed by the vendor certifying that each lot of seed has been tested by a recognized seed testing laboratory within 6 months before the date of delivery on the project. Seed which has become wet, moldy, or otherwise damaged in transit or storage will not be accepted.

Seed mix and rate of application shall be as specified in the special provisions.

9-14.3 Fertilizer.

Fertilizer shall be a standard commercial grade of organic or inorganic fertilizer of the kind and quality specified herein. It may be separate or in

a mixture containing the percentage of total nitrogen, available phosphoric acid, and water-soluble potash in the amounts specified. All fertilizers shall be furnished in standard unopened containers with weight, name of plant nutrients, and manufacturer's guaranteed statement of analysis clearly marked, all in accordance with State and Federal laws.

Acceptable commercial fertilizer may be supplied in one of the following forms:

(1) A dry free-flowing granular fertilizer, suitable for application by agricultural fertilizer spreader.

(2) A soluble form that will permit complete suspension of insoluble particles in water, suitable for application by power sprayer.

(3) A homogeneous pellet, suitable for application through a Ferti-blast gun.

(4) A tablet or other form of controlled release with a minimum of 1 year release period.

Commercial fertilizer formulation and rate of application shall be as specified in the special provisions.

9-14.3(1) Lime.

Agriculture lime shall be of standard manufacture, flour grade.

9-14.4 Mulch.

9-14.4(1) Straw.

All straw mulch material shall be in an air dried condition free of noxious weeds, weed seeds, and other materials detrimental to plant life. Straw shall be seasoned before baling or loading and shall be acceptable to the Engineer. Straw mulch so provided shall be suitable for spreading with mulch blower equipment. Rate of application shall be as specified in the special provisions.

9-14.4(2) Wood Cellulose Fiber.

Wood cellulose fiber mulch shall be specially processed wood fiber containing no growth or germination inhibiting factors and shall be dyed a suitable color to facilitate inspection of the placement of the material. It shall be manufactured in such a manner that after addition and agitation in slurry tanks with water, the fibers in the material will be come uniformly suspended to form a homogenous slurry. When hydraulically sprayed on the ground, the material shall allow the absorption and percolation of moisture.

Each package of the cellulose fiber shall be marked by the



Standard Methods of Test for MOISTURE-DENSITY RELATIONS OF SOILS USING 10-lb (4.5-kg) RAMMER AND 18-in. (457-mm) DROP¹

This Standard is issued under the fixed designation D 1557; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval.

1. Scope

1.1 These methods cover the determination of the relationship between the moisture content and density of soils when compacted in a mold of a given size with a 10-lb (4.5-kg) rammer dropped from a height of 18 in. (457 mm). Four alternative procedures are provided as follows:

	Sections
<i>Method A</i> —A 4-in. (102-mm) mold: soil material passing a No. 4 (4.75-mm) sieve	3 and 4
<i>Method B</i> —A 6-in. (152-mm) mold: soil material passing a No. 4 (4.75-mm) sieve	5 and 6
<i>Method C</i> —A 4-in. mold: soil material passing a $\frac{3}{4}$ -in. (19-mm) sieve	7 and 8
<i>Method D</i> —A 6-in. mold: soil material passing a $\frac{3}{4}$ -in. sieve	9 and 10

1.2 The method to be used should be indicated in the specification for the material being tested. If no method is specified, the provisions of Method A shall govern.

2. Apparatus

2.1 *Molds*—The molds shall be cylindrical in shape, made of metal, and shall have the capacity and dimensions indicated in 2.1.1 and 2.1.2. They shall have a detachable collar assembly approximately $2\frac{1}{2}$ in. (63.5 mm) in height, to permit preparation of compacted specimens of soil - water mixtures of the desired height and volume. The molds may be of the "split" type, consisting of two half-round sections or a section of pipe split along one element, which can be securely locked in place to form a cylinder as described above. The molds may also be the "taper" type,

provided the tapering of the internal diameter is uniform and not more than 0.200 in./lineal ft (16.6 mm/m) of mold height. The mold and collar assembly shall be so constructed that it can be fastened firmly to a detachable base plate. Capacity and dimensions of the molds shall be as follows:

2.1.1 *Mold*, 4.0-in. (102-mm) having a capacity of $1/30$ (0.0333) \pm 0.0003 ft³ (0.93 \pm 0.008 cm³), with an internal diameter of 4.0 ± 0.016 in. (102 ± 0.41 mm) and a height of 4.584 ± 0.005 in. (116.33 ± 0.13 mm) (see Fig. 1).

2.1.2 *Mold*, 6.0-in. (152.4-mm), having a capacity of $1/13.333$ (0.075) \pm 0.00075 ft³ (2.12 \pm .02 cm³), with an internal diameter of 6.0 ± 0.026 in. (152 ± 0.66 mm) and a height of 4.584 ± 0.005 (116.33 \pm 0.13 mm) in. (see Fig. 2).

2.2 Rammer

2.2.1 A manually operated metal rammer having a 2.0 ± 0.005 in. (50.8 ± 0.13 mm) diameter circular face and weighing 10 ± 0.02 lb (4536 ± 9 g). The rammer shall be equipped with a suitable guidesleeve to control the height of drop to a free fall of $18.0 \pm \frac{1}{16}$ in. (457.2 ± 1.6 mm) above the elevation of the soil. The guidesleeve shall have at least 4 vent holes not smaller than $\frac{1}{8}$ in. (9.5 mm) spaced 90 deg apart and $\frac{1}{4}$ in. (19.1 mm) from each end and shall provide sufficient clearances that free falls of the rammer shaft and head will not be

¹ These methods are under the jurisdiction of ASTM Committee D-18 on Soil and Rock for Engineering Purposes.

Current edition approved Jan. 22, 1970. Originally issued 1958. Replaces D 1557 - 66 T.

restricted.

2.2.2 Mechanical Rammer—A metal rammer that is mechanically operated by a device equipped to control the height of drop to a free fall of $18.0 \pm \frac{1}{16}$ in. (457.2 ± 1.6 mm) above the soil surface elevation and to uniformly distribute such drops on the soil surface. The manufactured weight of the rammer shall be 10.0 ± 0.02 lb (4536 ± 9 g) and the operating weight shall be determined from a calibration in accordance with ASTM Method D 2168, for Calibration of Mechanical Laboratory Soil Compactors.³ There shall be 0.1 ± 0.03 -in. (2.54 ± 0.76 -mm) clearance between the rammer and the smallest internal diameter of the mold.

2.2.3 Rammer Face—The circular face rammer shall be used but a sector face rammer may be used as an alternative, provided the report shall indicate the type of face used other than the 2-in. (50.8-mm) circular face.

2.2.4 Circular-Face Rammer shall have a flat face, 2.0 ± 0.005 -in. (50.8 ± 0.13 -mm) diameter with a soil contacting face of 3.142 ± 0.031 in.² (20 ± 0.2 cm²).

2.2.5 Sector-Face Rammer for use with 4.0-in. (101.6-mm) diameter molds shall have a flat face, 1.9 ± 0.02 -in. (48.3 ± 0.5 -mm) radius with a soil contacting face of 3.14 ± 0.03 in.² (20 ± 0.2 cm²) which is a sector of a circle.

2.2.6 Sector-Face Rammer for use with 6.0-in. (152.4-mm) diameter molds shall have a flat face, 2.9 ± 0.02 -in. (50.8 ± 0.51 -mm) radius with a soil contacting face of 3.14 ± 0.03 in.² (20 ± 0.2 cm²) which is a sector of a circle.

2.3 Sample Extruder (optional)—A jack, frame, or other device adapted for the purpose of extruding compacted specimens from the mold.

2.4 Balances—A balance or scale of at least 25-lb (11.34-kg) capacity sensitive to 0.01 lb (4.54 g) and a balance of at least 1000-g capacity sensitive to 0.1 g.

2.5 Drying Oven—A thermostatically controlled drying oven capable of maintaining a temperature of 230 ± 9 F (110 ± 5 C) for drying moisture samples.

2.6 Straightedge—A steel straightedge about 12 in. (305 mm) in length and having one beveled edge.

2.7 Sieves—2-in. (50-mm), $\frac{1}{4}$ -in. (19-mm)

and No. 4 (4.75-mm) sieves conforming to the requirements of ASTM Specification E 11, for Wire-Cloth Sieves for Testing Purposes.³

2.8 Mixing Tools—Miscellaneous tools such as mixing pan, spoon, trowel, spatula, etc., or a suitable mechanical device for thoroughly mixing the sample of soil with increments of water.

METHOD A

3. Sample

3.1 If the soil sample is damp when received from the field, dry it until it becomes friable under a trowel. Drying may be in air or by use of drying apparatus such that the temperature of the sample does not exceed 140 F (60 C). Then thoroughly break up the aggregations in such a manner as to avoid reducing the natural size of individual particles.

3.2 Pass an adequate quantity of the representative pulverized soil through the No. 4 (4.75-mm) sieve. Discard the coarse material, if any, retained on the No. 4 sieve.

3.3 Select a representative sample, weighing approximately 7 lb (3.18 kg) or more, of the soil prepared as described in 3.1 and 3.2.

4. Procedure

4.1 Thoroughly mix the selected representative sample with sufficient water to dampen it to approximately four percentage points below optimum moisture content.

4.2 Form a specimen by compacting the prepared soil in the 4-in. (102-mm) mold (with collar attached) in five equal layers to give a total compacted depth not to exceed 5 in. (127 mm). Compact each layer by 25 uniformly distributed blows from the rammer. During compaction, the mold shall rest on a uniform, rigid foundation, such as provided by a cylinder or cube of concrete weighing not less than 200 lb (90.72 kg). Following compaction, remove the extension collar, carefully trim the compacted soil even with the top of the mold by means of the straightedge, and weigh. Multiply the weight of the compacted specimen and mold, minus the weight of the mold, by 30 (or divide by 942.95), and record the result as the wet unit weight, γ_m , in pounds per

³ Annual Book of ASTM Standards, Part 11.

⁴ Annual Book of ASTM Standards, Part 30.



cubic foot of the compacted soil.

4.3 Remove the material from the mold and slice vertically through the center. Take a representative sample of the material from one of the cut faces and determine moisture content in accordance with ASTM Method D 2216, for Laboratory Determination of Moisture Content of Soil.*

4.4 Thoroughly break up the remainder of the material until it will pass a No. 4 (4.75-mm) sieve as judged by eye. Add water in sufficient amounts to increase the moisture content of the soil sample by one or two percentage points, and repeat the above procedure for each increment of water added. Continue this series of determinations until there is either a decrease or no change in the wet unit weight, γ_m , in pounds per cubic foot of the compacted soil.

NOTE 1—This procedure has been found satisfactory in most cases. However, in instances where the soil material is fragile in character and will reduce significantly in grain size due to repeated compaction, and in cases where the soil is a heavy-textured clayey material into which it is difficult to incorporate water, a separate and new sample shall be used in each compaction test. In these cases, the separate samples shall be thoroughly mixed with amounts of water sufficient to cause the moisture contents of the samples to vary by approximately two percentage points. The moisture contents selected shall bracket the optimum moisture content, thus providing samples which, when compacted, will increase in weight to the maximum density and then decrease in weight. The samples of soil-water mixtures shall be placed in covered containers and allowed to stand for not less than 12 h before making the moisture-density test.

METHOD B

5. Sample

5.1 Select the representative sample in accordance with 3.3, except that it shall weigh approximately 16 lb (7.26 kg).

6. Procedure

6.1 Follow the same procedure as described for Method A in Section 4, except for the following: Form a specimen by compacting the prepared soil in the 6-in. (152.4-mm) mold (with collar attached) in five equal layers to give a total compacted depth not to exceed 5 in. (127 mm), each layer being compacted by 56 uniformly distributed blows from the rammer. Multiply the weight of the compacted specimen and mold, minus the weight of the mold, by 13.33 (or divide by 2123.76). Record

the result as the wet unit weight, γ_m , in pounds per cubic foot of the compacted soil.

METHOD C

7. Sample

7.1 If the soil sample is damp when received from the field, dry it until it becomes friable under a trowel. Drying may be in air or by use of drying apparatus such that the temperature of the samples does not exceed 140 F (60 C). Then thoroughly break up the aggregations in such a manner as to avoid reducing the natural size of individual particles.

7.2 Pass an adequate quantity of the representative pulverized soil through the $\frac{3}{4}$ -in. (19-mm) sieve. Discard the coarse material, if any, retained on the $\frac{3}{4}$ -in. sieve.

NOTE 2—If it is advisable to maintain the same percentage of coarse material (passing a 2-in. (50.8-mm) sieve and retained on a No. 4 (4.75-mm) sieve) in the moisture-density sample as in the original field sample, the material retained on the $\frac{3}{4}$ -in. (19-mm) sieve shall be replaced as follows: Pass an adequate quantity of the representative pulverized soil through the 2-in. (50-mm) and $\frac{3}{4}$ -in. (19-mm) sieves. Discard the coarse material retained on the 2-in. sieve. Remove the material passing the 2-in. sieve and retained on the $\frac{3}{4}$ -in. sieve and replace it with an equal weight of material passing the $\frac{3}{4}$ -in. sieve and retained on the No. 4 sieve. Take the material for replacement from the unused portion of the sample.

7.3 Select a representative sample, weighing approximately 12 lb (5.4 kg) or more, of the soil prepared as described in 7.1 and 7.2.

8. Procedure

8.1 Thoroughly mix the selected representative sample with sufficient water to dampen it to approximately four percentage points below optimum moisture content.

8.2 Form a specimen by compacting the prepared soil in the 4-in. (101.6-mm) mold (with collar attached) in five equal layers to give a total compacted depth not to exceed 5 in. (127 mm). Compact each layer by 25 uniformly distributed blows from the rammer. During compaction, the mold shall rest on a uniform, rigid foundation, such as is provided by a cylinder or cube of concrete weighing not less than 200 lb (90.7 kg). Following compaction, remove the extension collar and carefully trim the compacted soil even with the top of the mold by means of the straightedge. Patch holes developed in the surface by removal of

coarse material with smaller size material. Weigh the mold and moist soil. Multiply the weight of the compacted specimen and mold, minus the weight of the mold, by 30 (or divide by 942.95), and record the result as the wet unit weight, γ_m , in pounds per cubic foot of the compacted soil.

8.3 Remove the material from the mold and slice vertically through the center. Take a representative sample of the material from one of the cut faces, weigh immediately, and dry in an oven at 230 ± 9 F (110 ± 5 C) for at least 12 h, or to constant weight, to determine the moisture content. The moisture content sample shall weigh not less than 500 g.

8.4 Thoroughly break up the remainder of the material until it will pass a $\frac{1}{4}$ -in. (19-mm) sieve and 90 percent of the soil aggregations will pass a No. 4 (4.75-mm) sieve as judged by eye. Add water in sufficient amounts to increase the moisture content of the soil sample by one or two percentage points, and repeat the above procedure for each increment of water added. Continue this series of determinations until there is either a decrease or no change in the wet unit weight, γ_m , in pounds per cubic foot of the compacted soil (see Note 1).

METHOD D

9. Sample

9.1 Select the representative sample in accordance with 7.3, except that it shall weigh approximately 25 lb (11.3 kg).

10. Procedure

10.1 Follow the same procedure as described for Method C in Section 8, except for the following: Form a specimen by compacting the prepared soil in the 6-in. (152.4-mm) mold (with collar attached) in five equal layers to give a total compacted depth not to exceed 5 in. (127-mm) each layer being compacted by 56 uniformly distributed blows from the rammer. Multiply the weight of the compacted specimen and mold, minus the weight of the mold, by 13.33 (or divide by 2123.76). Record the result as the wet unit weight, γ_m , in pounds per cubic foot of the compacted soil.

CALCULATIONS AND REPORT

11. Calculations

11.1 Calculate the moisture content and the dry unit weight of the soil as compacted for each trial, as follows:

$$= [(A - B)/(B - C)] \times 100$$

and

$$\gamma_d = [\gamma_m/(w + 100)] \times 100$$

where:

w = percentage of moisture in the specimen,

A = weight of container and wet soil,

B = weight of container and dry soil,

C = weight of container,

γ_d = dry unit weight, in pounds per cubic foot of compacted soil, and

γ_m = wet unit weight, in pounds per cubic foot of compacted soil.

12. Moisture-Density Relationship

12.1 Plot the dry unit weights in pounds per cubic foot (densities) of the soil as ordinates and the corresponding moisture contents as abscissas. Draw a smooth curve connecting the plotted points.

12.2 *Optimum Moisture Content, w_o* —The moisture content corresponding to the peak of the curve drawn as directed in 12.1 shall be termed the "optimum moisture content" of the soil under the above compaction.

12.3 *Maximum Density, γ_{max}* —The dry unit weight in pounds per cubic foot of the soil at "optimum moisture content" shall be termed "maximum density" under the above compaction.

13. Report

13.1 The report shall include the following:

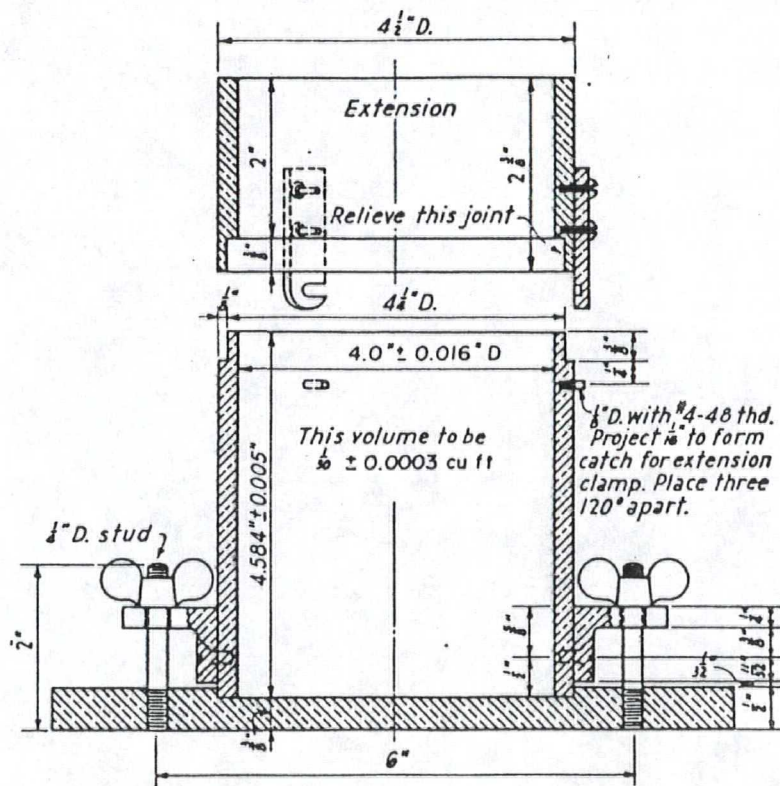
13.1.1 The method used (Method A, B, C, or D),

13.1.2 The optimum moisture content, and

13.1.3 The maximum density.

13.1.4 In Methods C and D, indication of removal or replacement of $\frac{1}{4}$ -in. (19.1-mm) material.

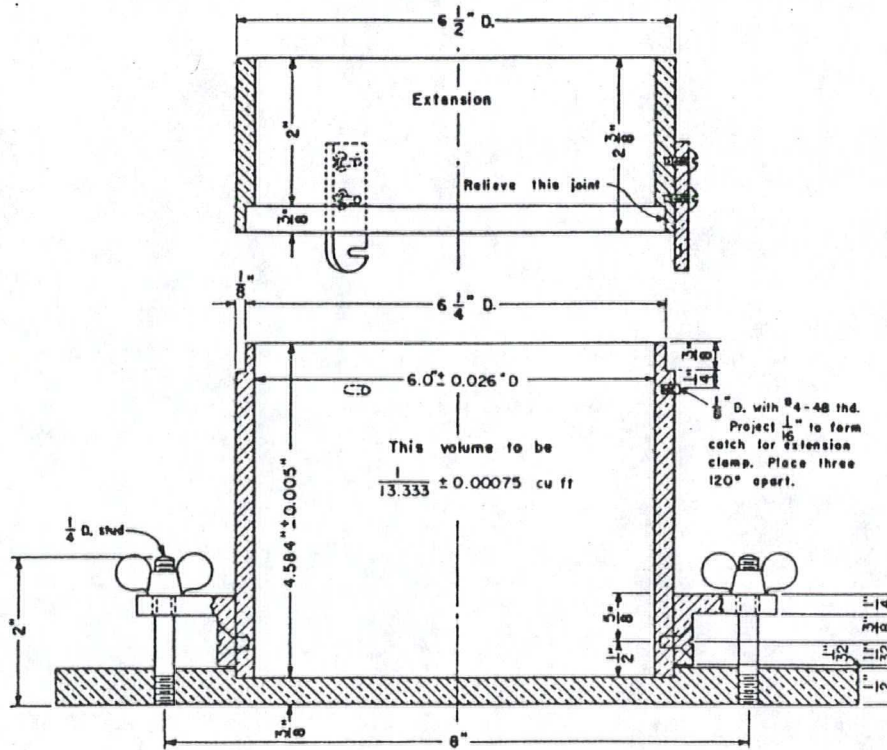
13.1.5 Type of face if other than 2-in. (50.8-mm) circular.



Metric Equivalents

in.	mm	in.	mm
$\frac{1}{16}$	0.8	$\frac{1}{4}$	15.9
$\frac{1}{8}$	3.2	2	50.8
$\frac{3}{16}$	6.4	$2\frac{1}{4}$	60.3
$\frac{1}{2}$	8.7	$4\frac{1}{4}$	108.0
$\frac{3}{4}$	9.5	$4\frac{1}{2}$	114.3
1	12.7		

FIG. 1 Cylindrical Mold, 4.0-in. (101.6-mm), for Soil Tests.



Metric Equivalents

in.	mm	in.	mm
$\frac{1}{16}$	0.8	$\frac{1}{4}$	15.9
$\frac{1}{8}$	3.2	$\frac{1}{2}$	50.8
$\frac{1}{4}$	6.4	$\frac{3}{4}$	60.3
$\frac{3}{8}$	8.7	$1\frac{1}{4}$	108.0
$\frac{1}{2}$	9.5	$1\frac{1}{2}$	114.3
$\frac{5}{8}$	12.7		

FIG. 2 Cylindrical Mold, 6.0-in. (152.4-mm) for Soil Tests.

By publication of this standard no position is taken with respect to the validity of any patent rights in connection therewith, and the American Society for Testing and Materials does not undertake to insure anyone utilizing the standard against liability for infringement of any Letters Patent nor assume any such liability.

T. J. Cune
Dick J
467-1649

Attached Invitation to Bid to the following 5/13/83:

N. A. Degerstrom, Inc.
P. O. Box 425
North 3303 Sullivan Road
Spokane, WA 99210

Motley and Motley
P. O. Box 421
SW 640 Fountain
Pullman, WA 99163

Murphy Brothers
P. O. Box 2685
East 3812 Broadway
Spokane, WA 99220

Ibex Construction, Inc.
South 1212 Bernard
Spokane, WA 99204
Attn: Tim Jackson

Max J. Kuney Company
North 120 Ralph
Spokane, WA 99202
Attn: Jeff Kuney

Circle M. Construction Company
East 12122 First
Spokane, WA 99206
Attn: Pat Michielli, Jr.

Inland Asphalt
P. O. Box 11036, Parkwater Station
Spokane, WA 99211

Eller Corporation
Newman Lake, WA 99025

Invitation To Bid

Date

May 13, 1983

Gentlemen:

Proposals will be received by Kaiser Aluminum & Chemical Corporation (hereinafter called "Owner") for performing the Work set forth in Specification Number

	Revised
1. The Contract Form	10/79
2. Exhibit "C" — General Conditions for Contracts	10/79
3. Exhibit "D" — Contractor Furnished Insurance	10/79
4. Exhibit "E" — Performance Bond	10/79
5. Exhibit "J" — Equal Employment Opportunity	10/79
6. Exhibit "P" — Contractor's Performance Schedule (Sample)	
7. Exhibit "S" — Contractor Health, Safety, Security and Fire Protection Requirements	10/79

LOCATION OF THE WORK: The Work under the above Specification shall be performed at the Owner's plant site located at

Trentwood Works
Spokane, WA

PROPOSALS: Proposals shall be submitted only to the persons designated below and on the attached Proposal Form, and shall be presented or mailed by the party executing said Proposal (hereinafter called "Bidder"). Proposals shall be accompanied by the information requested in the attached Exhibit "E". Proposals shall be addressed to the undersigned and delivered or mailed to Kaiser Aluminum & Chemical Corporation as follows: P. O. Box 15108, Spokane, WA 99215, Attn:

L. L. Buchholz

A JOB SITE ORIENTATION SHALL BE CONDUCTED AT
10:00 A.M., MAY 24, 1983.

DUE DATE: Proposals will be received by Owner at the above address until 4:00 p.m., May 31, 1983

WITHDRAWAL: The Proposal may be withdrawn by Bidder at any time prior to due date set forth above without prejudicing Bidder's right to file another Proposal; provided such other Proposal complies with the conditions hereof and is received prior to the due date set forth above. Bidders may withdraw Proposals by submitting written notice of withdrawal to Owner prior to bid due date.

REFERRALS: Proposals shall be submitted by addressee only, unless written permission to refer Proposals and attachments to another firm is obtained from Owner.

REJECTION: Owner reserves the unconditional right to reject any or all Proposals or to waive irregularities therein.

ADDITIONAL INFORMATION: Bidders requesting additional information or permission to examine the site are advised to address their inquiries to

T. J. Aune or L. L. Buchholz
924-1500, Ext 6352 924-1500, Ext 6522

RETURN OF PLANS AND SPECIFICATIONS: The subject matter of the drawings and specifications involves valuable proprietary rights of Owner and is to be treated in confidence by Bidder and its employees and shall not be used by them except for the specific purpose of preparing and submitting a Proposal. Upon receiving notice that the Work has been awarded to another firm, unsuccessful Bidders shall return the enclosed drawings and specifications to Owner.

ACKNOWLEDGMENT OF BIDDER: Within ten (10) days after receipt of this notice, Bidder is requested to notify Owner of his intention to submit a Proposal, by the date specified herein, or if he does not intend to submit a Proposal, return this Bid Package.

BID BOND: Bidder shall furnish a Bid Bond in the amount of 10% of his price with his Proposal.

Very Truly Yours,

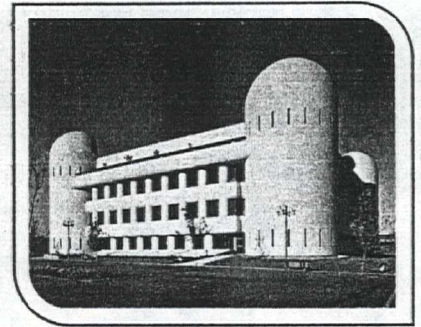
KAISER ALUMINUM & CHEMICAL CORPORATION

L. L. Buchholz, Sr. Purchasing Agent

1985
SAMPLING

Spokane County Health District

West 1101 College Avenue Spokane, Washington 99201



June 22, 1983

Mr. Phil Williams
Environmental Engineer
Kaiser Trentwood Works
P.O. Box 15108
Spokane, Washington 99215

Re: Clay Cap Seal for the Eastside Landfill/Monitoring Program

Dear Mr. Williams:

Our agency has reviewed the engineering report for the clay cap placement over the former dross disposal area of the eastside landfill. We find the proposed project to be quite acceptable.

We also note that Kaiser is committed to an on-going ground water monitoring program for chlorides and nitrates. As a related issue our agency indicated to you a year ago our concern that an on-going monitoring program be reinstated for the westside landfill. This has been delayed until DOE's concern for the eastside landfill was addressed; thus, creating an integrated monitoring system to serve both solid waste disposal sites. There are some additional chemical tests we feel are necessary for the ground water monitoring of the westside landfill. We will be contacting you shortly in regards to this matter. Thank you for the opportunity to review this project.

Sincerely,

ENVIRONMENTAL HEALTH DIVISION

John Anicetti, R.S.
Solid Waste Coordinator

ts

c: D. Dunster, DOE
Daryl Way SCHD

Administration
Clinic

456-3630
456-3640

Personal Health
Vital Statistics

456-3613
456-3670

Environmental Health
Laboratory

456-6040
456-3667

An Equal Opportunity Employer



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

East 103 Indiana • Spokane, Washington 99207 • (509) 456-2926

June 17, 1983

Kaiser Aluminum & Chemical Corp.
Trentwood Works
P. O. Box 15108
Spokane, WA 99215

Attention: Mr. Phil Williams

Dear Phil:

We have reviewed your Engineering Report for capping the Trentwood East Landfill. We endorse this proposal, subject to the following monitoring and evaluation schedule for the five year period following completion of the project:

1. Visually inspect the capped area for integrity of soil and clay cap at least quarterly and maintain records of the inspections.
2. Immediately take remedial measures to correct any problems due to erosion or gas buildup that impairs the integrity of the soil or clay cap.
3. Conduct monthly analysis of chlorides and nitrates from the monitoring wells and affected production wells.
4. At the end of the five year monitoring period, prepare a written evaluation on ground water quality and submit it to the Washington Department of Ecology.

We do not anticipate taking any further action under 90.48 RCW or Chapter 173-201 WAC, barring unforeseen circumstances, related to the east landfill during the five year monitoring and evaluation period.

The department appreciates your concern and actions to mitigate this source of contamination of the aquifer. Hopefully, this will prove to be an effective solution to this problem.

Sincerely,

Douglas G. Dunster
Environmental Quality Division

DGD:adw

cc: John Anicetti, Spokane County Health District

ELLER CORPORATION

BOX 117 - 226-3588
NEWMAN LAKE, WASHINGTON 99025

223-01EL-LE-RC*242C3


Information requested by Exhibit "E"

1. Sub-contractors that the Bidder proposes to use:
Circle M Construction - hauling in clay and topsoil
Arrow Contracting - fence installation

2. Major construction equipment:
 - (2) TS-24 Terex Scrapers - 28 cy capacity
 - (1) 82-30B Terex Dozer~
 - (1) Champion D240A Articulated Grader~
 - (1) 4000 gal. water truck~
 - (1) 950 Cat loader 3.5 cy bucket~
 - (3) 12-14 cy dump trucks~
 - (2) pup trailers~
 - (1) Sheepsfoot vibratory roller/compactor~
 - (1) Ingersol Rand SP-42 vibratory roller~
 - (1) 266 Bantam Backhoe 1 cy bucket, 1¼ cy bucket

Signed this 31st day of May, 1983

Eller Corporation

By: 

Name/Title: Charles Thomas Eller, Jr.
Secretary

EXHIBIT "E"

INFORMATION TO BE FURNISHED WITH PROPOSAL

Specification TR-20551 sets forth the requirements for the installation of a clay cover on the east landfill at the Kaiser Aluminum & Chemical Corporation's Trentwood Works.

In order to assist the Owner in the evaluation of the bids, each of the Bidders shall furnish the following information with his bid proposal.

1. Sub-contractors that the Bidder proposes to use and the limits of their work.
2. A list of major construction equipment Bidder will use for this work, including number of units, description and capacity.
3. The time required for Bidder to mobilize, move onto the job site and start work. 5 calendar days.
4. Total combined markup, whether the work is performed by Contractor or Subcontractors, for changes within the scope of work covering the following:
 - a. Materials, actual cost plus 10 %.
 - b. Equipment rental or use, percent of A.E.D. rates 90 %.
 - c. Combined allowance for overhead and profit for Subcontractors and contract work when work is subcontracted.
Direct cost plus 10 %.
 - d. Combined allowance for overhead and profit for Subcontractors and contract work when work is subcontracted.
Direct cost plus 10 %.

EXHIBIT "E" (Continued)

e. Unit prices for:

1. Excavation	\$.85	Cy
2. Embankment	.23	Cy
3. Clay Layer	6.05	Cy
4. Top Soil & Seeding	4.25	Cy

5. Materials and Labor:

a. Site Preparation-Removal of Vegetation		\$ 690.00
b. Excavation:	9200. Cy .85	7820.00
c. Embankment:	8000. Cy .23	1840.00
d. Clay Layer:	14800. Cy 6.05	89540.00
e. Topsoil & Seeding:	9100. Cy 4.25	38675.00
f. Fencing:		5386.00
g. All Equipment Rental of Use:	included	
h. General Conditions, OH & P:	10%	14595.00
i. Miscellaneous - Specify:	Mobilization	2000.00

TOTAL LUMP SUM BID -

\$ 160,546.00

6. Total Manhours 1628 /MH